Tennessee Tech University

Plant Cells

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| Name: Kaylie Lahrs  Date: March 19, 2013 and March 23, 2013 Lesson Title: Plant Cells  Grade/Level: 5th Grade |
| Curriculum Standards |
| **Science:**  GLE 0507.1.1 Distinguish between the basic structures and functions of plant and animal cells.  SPI 0507.1.2 Compare and contrast basic structures and functions of plant and animal cells.  **Embedded Technology & Engineering:**  GLE 0507.T/E.1 Describe how tools, technology, and inventions help to answer questions and solve problems.  **Computer Technology:**  Standard 3.0 Students will use technology productivity tools.  **Learning Expectations:**  5.3.1 Students will use technology tools to enhance learning, increase productivity, and promote creativity.  5.3.2. Students will use productivity tools to collaborate in constructing technology enhanced models, prepare publications, and produce other creative works.  **Accomplishments:**  5.3.1 c. Use simulation software and tutorial software to assist with learning.  5.3.2 a. Use the computer and technology resources to practice learning skills in relation to other subject areas such as math, science, English, etc. |
| Focus Questions/Big Idea/Goal (List all 3) |
| * Focus Question: What are the different functions of a plant cell? * Big Idea: Plants are composed of tiny cells that have many functions that work together. * Goal: Students will be able to understand the basic structure and function of a plant cell. |
| Lesson Objective(s) |
| * Students will be able to create, label, and define the characteristics of a plant cell. * Students will be able to use a microscope to observe and find parts of a plant cell. |
| Vocabulary/ Academic Language |
| The teacher will have a video that will go over all these terms. Students will also use these terms when creating their cell cookie. The iPad app “Focus on Plant” also has all the terms.   * Cell wall - A rough, rigid structure that surrounds the cell membrane and gives the cell a regular, box-like shape. * Cell membrane - A membrane that separates the interior of the cell from its surroundings. * Cytoplasm - A jelly like substance within a cell, containing organelles, water, and other life-supporting materials. * Vacuole - Temporary storage compartments in cells, sometimes used to store waste. * Photosynthesis - The process by which plants use sunlight to synthesize foods from carbon dioxide and water. * Chloroplast - Part of plant cells that trap energy from the Sun and change it into chemical energy that plants use. * Golgi body - A structure in cells that sorts proteins and packs them into vessels. * Mitochondria - The energy producers of the cell. Also carries out cellular respiration to produce energy for the cell. * Endoplasmic reticulum - A network of membrane covered channels that transport materials. * Ribosomes - This is where cell parts (organelles) assemble proteins. * Nucleus - This is where the DNA is kept. * Nucleolus - An organelle within the nucleus - it is where ribosomal RNA is produced. * Lysosomes - A cell organelle that is surrounded by a membrane, it breaks down food molecules. * Plasma - A very thin membrane composed of lipids and protein, which surrounds the cytoplasm of a cell and controls the passage of substances into and out of the cell. |
| Material/Resources |
| * A matching handout with terms from the video * Exit ticket with questions on it * Paper * Pencil * Colored pencils * Cookies * Icing * Gummy worms * Green, pink, yellow, and blue sprinkles * Microscope * Digital Microscope * Slides of different plant cells * iPad * iPad app called “Focus on Plant” |
| Assessment/Evaluation |

**Formative***:*

The teacher will observe the students make their cell cookies and provide immediate feedback.

**Summative:**

Students will complete an exit ticket before leaving class that will later be graded to see what needs to be revisited.

List five different structures of a plant cell:

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Put a star next to the one you think is the most important and explain why.

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| Instruction  (Include a suggested time for each major activity) | List Questions for higher order thinking *These cannot be answered by yes or no.*  (Identify Bloom’s Level of Thinking) |
| **Set/Motivator:**   * Students will watch a YouTube video on plant cells “3D Plant Cell”. * <http://www.youtube.com/watch?v=he_Qw4_vOJk>. * The video discusses functions of the plant cell. * The students will answer questions about the plant cell as the video is being played.   Video Time: 5 minutes   * The students will be given time after the video to finish their handout, the video may need to be played twice.   Time to complete handout: 5 minutes | Remembering: What do you know about plant cells?  Understanding: Can you explain photosynthesis? |
| **Instructional Procedures/Learning Tasks:**   * After the students have grasped the basic functions of a plant cell the teacher will show slides of plant cells with the digital microscope projected on the board and point out basic characteristics such as color/chlorophyll, shape, cell wall, cell membrane, and the vacuole.   Time: 10 minutes   * The students will then have time to use a microscope with a partner and examine different plant cells trying to locate its different characteristics (students will have previously used microscopes in the classroom and know how to work them). * The students will write down the cells characteristics on a piece of notebook paper.   Time: 10 minutes   * Students will now have the chance to draw, label, and color their own plant cell. * Have the students use the iPad app “Focus on Plant” to help them illustrate their plant cell. * App Link: <https://itunes.apple.com/us/app/focus-on-plant/id540307989?mt=8>>. * The cell needs to be clearly labeled and colored. * For the students that finish early: They can explore this app more, there is a sections with vocabulary that they can go back over.   Time: 10 minutes | Applying: Can you draw and label a plant cell?  Analyzing: What characteristics does a plant cell have? |
| **Closure:**   * During this section the teacher will demonstrate this learning skill one more time by having them create a cell cookie! * Students will work individually on this project. * Students will first select a plain sugar cookie (the cell). * Then the students will add the icing (plasma). * Then the students will add the gummy worm (endoplasmic reticulum). * Then the students will add the sprinkles. * Green – chloroplast * Pink – nucleus * Yellow – mitochondria * Blue - ribosome’s   Time: 15 minutes   * The students will then quiz each other over the parts of their plant cell and their functions. * Then the students can eat the cookie!   Time: 5 minutes | Creating: Can you create a plant cell using a cookie, icing, sprinkles, and gummy worms?  Understanding: Why do you think leaves change color in Autumn? |

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| **Adaptations to Meet Individual Needs:**   * ELL students: can work with a partner for this activity and have more time to complete task. * SPED students: follow their IEP. * Gardner’s Learning Styles: * Interpersonal intelligence: Students will work in pairs when using the microscope. * Intrapersonal intelligence: Students will individually create a plant cell model and illustration. * Visual-Spatial intelligence: Students will watch a video and use a graphic organizer to define plant cell functions. * Logical-Linguistic intelligence: Students will analyze and discuss plant cells by using a microscope and creating/illustrating, and quizzing each other on the functions. * Bodily-kinesthetic: Students will be making a plant cell model with their hands.   **Management/Safety Issues:**  Teacher needs to address any food allergies. |
| **Rationale/Theoretical Reasoning:**  **Common Misconceptions:**  There are not too many misconceptions with the plant cell in general; but once you explore more into the topic of plant cells and teach about photosynthesis and respiration misconceptions may occur. One common student misconception is that plants photosynthesize during the day and conduct cellular respiration only at night. Some teaching literature even states this. Cellular respiration occurs continuously in plants, not just at night.  Another misconception is that students may think oxygen is only for breathing. Another function of oxygen is that is used by cells during respiration to break down sugars for energy.  (2008). “Misconceptions." North East Independent School District. Retrieved April 19, 2013 from <http://www.neisd.net/curriculum/SchImprov/sci/program/misconceptions_inter.htm#cells>>  Hershey, D. (2004). "Avoid Misconceptions When Teaching About Plants." *Actionbioscience*. Retrieved April 19, 2013 from <http://www.actionbioscience.org/education/hershey.html>>.  **Gardner’s Theory of Multiple Intelligences:**  The entire lesson focuses on different aspects of Gardner’s Theory of Multiple Intelligences as specified above in the “Adaptations to Meet Individual Needs” section.  Gardner, H. (2000), *Intelligence reframed: Multiple intelligences for the 21st century*. New York:  Basic Books  **Marzano’s Essential 9 Strategies that have been shown to improve student achievement:**   * NonlinguisticRepresentations – The physical model of the plant cell that the students create is a representative of Marzano’s fifth essential instructional strategy of nonlinguistic representations. According to research, nonlinguistic representations have been shown to increase and stimulate brain activity. * Reinforcing Effort and Providing Recognition – Students will receive praise from the teacher when working hard on creating their cell models in class. Marzano’s third essential instructional strategy of reinforcing effort and providing recognition by showing the connection between effort and achievement helps students helps them see the importance of effort and allows them to change their beliefs to emphasize it more. Note that recognition is more effective if it is contingent on achieving some specified standard. * Cooperative *Learning* - Marzano’s sixth essential instructional strategy of cooperative learning is demonstrated by the use of small group work when using the microscope. Cooperative learning in small groups and when used in a consistent and systematic manner has been proven through research to have a positive impact on overall learning. Groups should be varied in size and mixes and encourage positive interdependence, face-to-face interaction, social skills, accountability for the group and individuals.   Dean, C., Hubbell, E., Pitler, H., & Stone, B. (2012).  *Classroom Instruction that Works: Research-Based Strategies for Increasing Student Achievement, 2nd edition.*  ASCD McREL  Pitler, H. Hubbell, E., & Kuhn, M. (2012).  *Using Technology with Classroom Instruction that Works, 2nd Edition*. ASCD McREL  **Vygotsky:**  Throughout the lesson plan, the modeling is used while using the microscope to look at plant cells and its characteristics is indicative of the importance of Vygotsky’s research and development involved in the zone of proximal development. Discussion allows students the opportunity to talk through their ideas and solidify their understanding on what they are seeing through the microscope and trying to figure out what cell part they are seeing and its function. The video/questions, cell illustration, and iPad app provide an effective tool for assessment as a well as a great method for tactile learners and creative students who connect with pictures more readily than simple words in print.  Vygotsky, L.S. (1978). *Mind in society. The development of higher psychological processes*. Cambridge, MA: Harvard University Press. |
| **References:**   * Barlage, C. (2011). "3D Plant Cell." YouTube. Retrieved April 19, 2013 from <http://www.youtube.com/watch?v=he_Qw4_vOJk>>. * Wong, Q. (2012). "Focus on Plant." *App Store*. Touchapp.co.uk. Retrieved April 19, 2013 from <https://itunes.apple.com/us/app/focus-on-plant/id540307989?mt=8>>. |
| **Reflections/Future Modifications:**  I felt like the lesson went really well. I liked how the lesson could fit multiple grade levels, and was fun for everyone. I felt like we could not go over as much vocabulary that was planned, but got the main parts of the cell. We also talked about the similarities and differences of animal and plant cells. Some students however were more interested in trying to hurry through making their cookie just so they could eat it. We even had some students cake on the icing and toppings; so next time we would need to tell them how much or how many to put on their cookie. The students also really liked looking at the cells with the microscopes. The microscope that plugged in the wall magnified the cells much larger than the digital microscope. Next, instructionally, we could go over the plant cell in more detail. Photosynthesis would be a good topic to start after going over the plant cell functions. One thing we learned from our first event was that it would be easier if I just did the microscope activity as my partner did the cookie activity. This allowed us to have more time on each activity; it also helped when students came up to the cookie activity after it had already been started so they could just examine the microscope. This way we did not have to keep repeating ourselves with the cookie, and the groups were more organized. I learned that teaching children in different age groups was more challenging than I thought it would be, but overall a success. |

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Plant Cell Matching

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|  | Cell Wall | 1. The process by which plants use sunlight to synthesize foods from carbon dioxide and water. |
|  | Cell Membrane | 1. The energy producers of the cell. Also carries out cellular respiration to produce energy for the cell. |
|  | Cytoplasm | 1. This is where cell parts (organelles) assemble proteins. |
|  | Vacuole | D. Part of plant cells that trap energy from the Sun and change it into chemical energy that plants use. |
|  | Photosynthesis | E. A jelly like substance within a cell, containing organelles, water, and other life-supporting materials. |
|  | Chloroplast | F. A structure in cells that sorts proteins and packs them into vessels. |
|  | Golgi Complex | G. An organelle within the nucleus - it is where ribosomal RNA is produced. |
|  | Golgi Apparatus | H. A membrane that separates the interior of the cell from its surroundings. |
|  | Mitochondria | 1. A network of membrane covered channels that transport materials. |
|  | Endoplasmic Reticulum | 1. A cell organelle that is surrounded by a membrane, it breaks down food molecules. |
|  | Ribosomes | K. A rough, rigid structure that surrounds the cell membrane and gives the cell a regular, box-like shape. |
|  | Nucleus | L. A very thin membrane composed of lipids and protein, which surrounds the cytoplasm of a cell and controls the passage of substances into and out of the cell. |
|  | Nucleolus | M. This is where the DNA is kept. |
|  | Lysosomes | N. Temporary storage compartments in cells, sometimes used to store waste. |

Name:

Exit Ticket

List five different structures of a plant cell:

1.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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